

Discrete Structures

Welcome to Discrete Structures. Lets take a minute to discuss what this course is about, and why you're in it.

1. Discrete Structures is a mathematics course. There's no way around it since the ideas are important in the rest of the major.
2. Why do we need to know this math if we want to program?
 - (a) Everyone has built a paper airplane. Did you use much math?
 - (b) How about an F-18? Did the people who built that use much math?
 - (c) We can brute force any program out, especially if it is small enough, without thinking about the math involved. As the complexity grows, it becomes more important to understand this fact:
Programs are fundamentally mathematical entities and the proper design of them requires some level of understanding of the mathematical laws that govern them.
3. There are many good programmers out there who have never taken a class like this before. How can they be good if they need to know this math?
 - (a) 100% of these people understand the mathematics intuitively. It is that property that makes them good programmers.
 - (b) If you understand the math intuitively, then this course will be easy.
 - (c) If you don't, then this course will be necessary.
4. If this is a math course, why isn't it taught by the math department?
 - (a) Most of these topics *are* taught by the math department, just not all in one place.
 - (b) The course is organized around the set of topics you will need, rather than around a single coherent mathematical idea. This means that the different sections may be somewhat disconnected. Tough.
 - (c) Most of these topics are taught to upper level students who have much more math background than you.
 - (d) We're much better at drawing the connections from these topics back to computing.
5. OK, so what ARE we supposed to learn from this class?
 - (a) Mathematical reasoning. You will learn how to reason mathematically so that you can understand if a program is correct or not.
 - (b) Combinatorial Analysis. You will learn how to count things, lots of things, easily. This is useful when you count steps in a program (program speed), and counting pieces of information stored by the program (memory required).
 - (c) Discrete Structures. You will learn how to work with discrete structures, which are mathematical descriptions of the pieces of programs.
 - (d) Linear Algebra. You will learn all about how matrices can be used to represent discrete structures.